

CLAIMS

1. A process for the preparation of a functionalised porous material comprising the steps of:
 - 5 (i) sintering polymer components to provide a porous substrate; and
 - (ii) grafting a chemical species selected from
 - (a) a molecularly imprinted polymer; and
 - (b) a functionalised moietyonto the porous substrate to provide the functionalised porous material;
- 10 wherein when the polymer components are a polymer powder and the chemical species is a functionalised moiety, the chemical species is grafted using pulsed plasma polymerisation.
2. A process according to claim 1 wherein the polymer components are polyolefin
- 15 components.
3. A process according to claim 1 or 2 wherein the polymer components are polyethylene components.
- 20 4. A process according to any one of claims 1 to 3 wherein the polymer components are a polymer powder.
5. A process according to any one of the preceding claims wherein the polymer components are sintered in a mould.
- 25 6. A process according to any one of claims 1 to 4 wherein the polymer components are sintered in the form of a sheet.
7. A process according to any one of claims 1 to 3 wherein the polymer components are
- 30 polymer fibres.
8. A process according to any one of the preceding claims wherein the molecularly imprinted polymer is capable of interacting with a species selected from the group consisting of a metal ion, a toxin, a pharmaceutical compound and a microbial organism.

9. A process according to any one of the preceding claims wherein the molecularly imprinted polymer is capable of immobilising a species selected from the group consisting of a metal ion, a toxin, a pharmaceutical compound and a microbial organism.
- 5 10. A process according to any one of the preceding claims wherein the functionalised moiety comprises a cyclic group.
11. A process according to any one of the preceding claims wherein the functionalised moiety comprises an aromatic group.
- 10 12. A process according to any one of the preceding claims wherein the functionalised moiety comprises a phenylene group.
13. A process according to any one of the preceding claims wherein the functionalised moiety comprises a $-\text{C}_6\text{H}_4\text{-CH}_2-$ group.
- 15 14. A process according to any one of the preceding claims wherein the functionalised moiety comprises a functional group selected from the group consisting of an alcohol, an aldehyde, an amide, an amine, an ether, a halogen, an isocyanate and a sulphonic acid.
- 20 15. A process according to any one of the preceding claims wherein the functionalised moiety comprises a functional group selected from the group consisting of an alcohol, an amine and an ether.
- 25 16. A process according to any one of the preceding claims wherein the chemical species is grafted using plasma polymerisation.
17. A process according to any one of the preceding claims wherein the polymer components are a polymer powder and the chemical species is grafted using pulsed plasma polymerisation.
- 30 18. A process according to any one of the preceding claims wherein the chemical species is a functionalised moiety and the chemical species is grafted using pulsed plasma polymerisation.

19. A process according to any one of the preceding claims wherein the chemical species is grafted using pulsed plasma polymerisation.

20. A process according to any one of the preceding claims wherein the porous substrate comprises a body having an external surface and pores extending from the external surface into the body, wherein the pores define an internal surface and wherein the chemical species is grafted onto the external surface and onto the internal surface of the porous substrate.

21. A process according to claim 20 wherein the chemical species is grafted substantially uniformly throughout the porous substrate.

22. A process according to claim 20 or 21 wherein the number of grafted chemical species per unit area on the external surface is approximately equal to the number of grafted chemical species per unit area on the internal surface.

23. A functionalised porous material obtained by the process of any one of claims 1 to 22.

24. A functionalised porous material obtainable by the process of any one of claims 1 to 22.

25. A functionalised porous material comprising:

- (i) a porous substrate comprising a body having an external surface and pores extending from the external surface into the body, wherein the pores define an internal surface; and
(ii) a molecularly imprinted polymer

wherein the molecularly imprinted polymer is attached to the external surface and/or the molecularly imprinted polymer is attached to the internal surface of the porous substrate.

26. A functionalised porous material according to claim 25, wherein the molecularly imprinted polymer is attached to the external surface and the internal surface of the porous substrate.

27. A functionalised porous material according to claim 25 or 26 wherein the molecularly imprinted polymer is synthesised *in situ*.

28. A functionalised porous material according to claim 27 wherein the molecularly imprinted polymer is synthesised using plasma polymerisation.

5 29. A functionalised porous material according to claim 27 or 28 wherein the molecularly imprinted polymer is synthesised using pulsed plasma polymerisation.

30. A functionalised porous material according to claim 25 or 26 wherein the molecularly imprinted polymer is grafted onto the porous substrate.

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31. A functionalised porous material according to claim 30 wherein the molecularly imprinted polymer is grafted using plasma polymerisation.

15 32. A functionalised porous material according to claim 30 or 31 wherein the molecularly imprinted polymer is grafted using pulsed plasma polymerisation.

20 33. A functionalised porous material according to any one of the preceding claims wherein the molecularly imprinted polymer is capable of interacting with a species selected from the group consisting of a metal ion, a toxin, a pharmaceutical compound, or a microbial organism.

25 34. A functionalised porous material according to any one of the preceding claims wherein the molecularly imprinted polymer is capable of immobilising a species selected from the group consisting of a metal ion, a toxin, a pharmaceutical compound, or a microbial organism.

35. A functionalised porous material according to claim 33 or 34 wherein the species is a microbial organism.

30 36. A functionalised porous material according to any one of claims 23 to 35 comprising an RF tag.

37. A functionalised porous material according to any one claims 23 to 36 wherein the void volume is low.

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38. A functionalised porous material according to any one of claims 23 to 36 wherein the void volume is high.

39. A functionalised porous material according to claims 37 or 38 wherein the internal surface area is high.

40. A functionalised porous material according to claim 38 wherein the internal surface area is low.

41. A functionalised porous material according to any one of claims 23 to 40 wherein the functionalised porous material is in the shape of a cylinder or a rectangular prism.

42. A process substantially as hereinbefore described with particular reference to any one of the Examples.

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43. A functionalised porous material substantially as hereinbefore described with particular reference to any one of the Examples.